

MEMORANDUM

State of Alaska

Department of Environmental Conservation

Division of Air & Water Quality

Air Quality Maintenance Section

TO: Jim Baumgartner, Supervisor
Construction Permits
Air Quality Maintenance Section

DATE: March 8, 1999

FILE: 15.05 Model Approvals/Issues

THRU:

TELEPHONE NO: 465-5100; FAX: 465-5129

FROM: Alan E. Schuler, Environmental Engineer
Air Quality Maintenance Section

SUBJECT: ISC-PRIME Teleconference
with EPA Region 10

This memorandum summarizes a teleconference held on March 3, 1999, between Department staff and Rob Wilson of EPA Region 10 regarding the modeling of ambient air quality impacts under downwash conditions, including the possible general use of a non-Guideline model, ISC-PRIME. The teleconference grew out of a lengthy discussion between Jeff Anderson, Bill Walker, and myself on questions raised by industry regarding the Department's "Permit-by-Rule" modeling of exploratory drill rigs, and an informal request by ARCO Alaska, Inc (AAI), to use ISC-PRIME to model their Lisburne facility.

The highlights from our teleconference are:

1. Rob confirmed that we should not automatically exclude downwash regions when using ISCST3, since this zone may still contain ambient air.
2. The downwash algorithm in ISC-PRIME is based on "better science" than the downwash algorithm in ISCST3. Under some meteorological conditions, ISC-PRIME may provide concentrations that are three- to six-times smaller than ISCST3 estimates. However, in many cases, the difference in *maximum* (design) concentrations is small, with ISC-PRIME providing the slightly lower concentration.
3. For now, we should seek case-by-case approval, rather than general approval, to use ISC-PRIME. The items included in such a request are summarized in this memorandum.
4. Based on past precedent, it is possible that EPA's Office of Air Quality Planning and Standards (OAQPS) may approve the use of ISC-PRIME prior to it being listed as a Guideline model. This could occur after the close of EPA's upcoming public comment period for ISC-PRIME, *and* if there are no adverse comments.

BACKGROUND

There are several issues that lead to this teleconference. These issues are described below.

1. As part of the effort to develop a PBR for exploratory drill rigs, Bill has modeled the ambient impacts from generic North Slope and Cook Inlet drill rigs. An industry consultant

stated the modeled concentrations are questionable due to concerns with the downwash algorithm in ISCST3. In addition, the consultant believes that downwash conditions should be excluded from the ambient analysis. This approach would give industry a de facto exclusion zone that could extend into areas that are clearly ambient air. In addition, if we accepted the consultant's suggestion in the PBR modeling, we would have to accept the same approach in all other ambient demonstrations. Bill, Jeff, and I believe that modeling demonstrations should include those portions of the downwash regions that are ambient air, but wanted to hear Rob's thoughts on it.

2. EPA is currently reviewing a new downwash algorithm for ISC, named ISC-PRIME. ISC-PRIME was developed by the Electric Power Research Institute (EPRI) to address industry concerns that the current ISCST3 downwash algorithm is overly conservative. EPA has informally expressed their intention to include ISC-PRIME as an approved model in an upcoming proposal to revise their *Guideline on Air Quality Models*. The proposed revisions are several months behind schedule. However, the latest rumor is that EPA will issue their formal public notice later this month.

Non-guideline models, such as ISC-PRIME, can still be used in regulatory actions on a case-by-case basis. Last year, the Department and EPA Region 10 approved the use of ISC-PRIME for a modeling analysis submitted by the Golden Valley Electric Association (GVEA) for their Healy Power Plant. EPA's approval included a comparison of the Healy Power Plant sources with the sources used to validate and develop ISC-PRIME. However, the basic premise of EPA's approval is that ISC-PRIME is a better modeling tool than ISCST3.

AAI recently inquired if they too can use ISC-PRIME to model their Lisburne facility, which is located in the North Slope Coastal Plain of Prudhoe Bay. AAI may be submitting an ambient demonstration as part of a construction permit application, but was having trouble demonstrating compliance under downwash conditions. We discussed with AAI the need for case-by-case approval by the Department and EPA, and that we would discuss their request with EPA Region 10.

Bill, Jeff, and I discussed these issues. We had the following thoughts: 1) ISC-PRIME may be helpful for the PBR modeling analysis; 2) the Department will likely receive additional requests to use ISC-PRIME (especially if we approve its use for a second time); and 3) EPA's approval for Healy was mostly based on general validation studies, not the specific demonstration submitted by GVEA. Therefore, we wondered if it would be preferable, and possible, to obtain a semi-generic approval to use ISC-PRIME rather than submitting numerous case-by-case requests.

DISCUSSION

We shared the above thoughts with Rob. He confirmed that downwash regions should not be automatically excluded from an ambient demonstration. Rob is not in the EPA program that would review our PBR submittal. However, he believes that an ambient demonstration should be included in the package. Rob encouraged Bill to compare the modeled concentrations with concentrations obtained with ISC-PRIME. If the ISC-PRIME results are favorable, we could request formal approval to use ISC-PRIME for the PBR submittal.

Rob also shared his general impressions regarding ISC-PRIME. In many cases, ISC-PRIME does not do much better (lower estimates) than ISCST3, as expected by industry. It is a better technical tool, though.

ISCST3 does not provide estimates in the cavity region. Ambient impacts at receptors in these regions only include concentrations from sources that are not caught in cavity downwash. Consequently, while the downwash algorithm may be overly conservative, in some cases ISCST3 may still underestimate ambient impacts. ISC-PRIME is an improvement over ISCST3 in that ISC-PRIME does include cavity region impacts.

ISC-PRIME is also an improvement from ISCST3 in that it considers the actual stack location relative to the building. Stack location can be an important factor in downwash, especially when the stack is separated from the structure.

ISCST3 can show downwash conditions when they are not expected. For example, low buoyancy at stable conditions and low wind speeds may produce downwash in ISCST3. ISC-PRIME appears to more realistically handle these conditions.

OAQPS has issued memorandums allowing general use of proposed Guideline models. The approval has to come after the close of the public comment period for the proposed model, and if there are no adverse comments. This approach allows the model to be used during the time that the proposed Guideline revisions are being finalized. Rob suspects that OAQPS *may* issue a similar memorandum for ISC-PRIME. Under the current public notice schedule, the memorandum (if issued) would not be released until fall.

In the meantime, Rob felt we should continue to request permission to use ISC-PRIME on a case-by-case basis. Rob did not feel comfortable issuing a semi-generic approval.¹ Requests should reference the studies used to develop and validate ISC-PRIME. They should also compare the stack geometry and source characteristics for the sources used to validate ISC-PRIME with those for the case at hand. For the **stack geometry**, the applicant will need to compare the stack height to building height ratio, along with the stack location relative to the building location. For **source characteristics**, the applicant will need to compare the buoyancy flux and momentum flux for the various cases. The buoyancy flux and momentum flux for the case at hand should be in the same “ballpark” as the buoyancy flux and momentum flux used in some of the validation studies. The equations for determining the buoyancy and momentum fluxes are in Volume II (*Description of Model Algorithms*) of the ISC User’s Guide.

AES/pal (h:\home\aschuler\model\gd\prime teleconference memo.doc)

cc: Jeff Anderson, ADEC/AQM, Juneau
Bill Walker, ADEC/AQM, Juneau
Rob Wilson, EPA Region 10, Seattle

¹ In a March 5, 1999 e-mail, Rob further explained his reasons for not wanting to give a semi-generic approval for ISC-PRIME. Rob stated there are *some* uncertainties about ISC-PRIME being formally approved by EPA. The uncertainties are due to: 1) questions about documentation adequacy; 2) peer review adequacy; and 3) a remote chance that something “PRIME-like” would be added to AERMOD in time to be added to the upcoming Guideline revisions.